

HOME ENTERTAINMENT SYSTEM COMBINING COMPLEX PROCESSOR CAPABILITY WITH A HIGH QUALITY DISPLAY

FIELD OF THE INVENTION

The present invention relates to a home entertainment system, and in particular to a system having a high quality monitor to display digitally received broadband video without loss of signal quality.

BACKGROUND OF THE INVENTION

The consumer electronics industry has created many stand alone products for specific functions, such as television viewing, video recording and playback, broadband video receivers, playing recorded music and broadcast music. Some devices combine functions, such as the combination TV/VCR, and the audio cassette/AM/FM receiver to name a couple. One direction that consumers are moving is toward larger televisions located within a family room or living room with accompanying high quality stereo. Multiple components are required, each providing separate functions. A large screen television based on a 19 inch to 40 inch picture tube, or 46 inch to 60 inch projection system is used and viewed from a distance of two to five meters. The television includes a tuner for receiving and decoding National Television Systems Committee (NTSC) signals, infrared receiver circuitry for a remote control, and in many cases stereo and surround sound integrated into it, making it a very expensive device. Further, the consumer likely has a video recorder/player, and perhaps a cable box/set top box to receive cable or satellite transmission which may also include a video tuner and other electronics to handle modulated, compressed and encrypted video signals. In addition, a consumer is also likely to have a separate stereo system complete with CD player, tuner and other audio attachments, such as speakers. This duplicates much of the functionality of the television system and adds to the cost of a home entertainment center.

Most consumer electronic devices come with remote control devices, which as in the case of the television above, require sensing circuitry to receive and process the signals from the remotes. Such controls are typically based on IR signals which can be interrupted by someone walking in front of it, and are not able to be used in a different room from the receiver. While a few have on-screen programming functions, and there are special remote control devices which can be programmed to control multiple consumer electronic devices found in a home entertainment center, there is little consistency between such controls. In addition, there is no good way to use different remote control its to control different programs generating the information displayed in various windows on the screen. This leads to confusion of the consumer, and the classic case of the blinking "12:00" as consumers become frustrated trying to master all the protocols required to appropriately control their electronic devices. Trying to program a VCR to record a program in the future can also be quite difficult. The expense of the additional circuitry in all the devices to accomplish these functions is borne by the consumer.

Multimedia based personal computers today are configured with CD Rom drives, and speakers as well as graphics drivers for displaying graphics on a monitor attached to the computer. CD Rom drives are capable of both reading data, such as computer programs, and reading audio information such as music which is output from the attached speakers.

Multimedia titles for running on a PC usually are distributed on CD Rom, and involve such things as animated encyclopedias and other books, as well as games that may incorporate video clips which can be shown on a PC display. More and more of the video information on such CDs is compressed in accordance with Motion Picture Experts Group (MPEG) standards and requires commercially available software or circuitry to decompress it and process it for display. The display signal is typically of VGA quality. Some add on products for PCs even provide a connection to video feeds from multiple sources for playing in a window on the monitor screen. Typically, the computer has a video graphics adapter (VGA or SVGA) card which processes all the information to be displayed on a monitor and the monitor itself is basically a picture tube that shows only what it is sent with very little processing. However, most PC displays are small, and not suitable for viewing by multiple people at the same time. It often happens that when a family gets a new program such as a game, animated book or educational game, everyone wants to see it being used for the first time, and they huddle around a small display and vie for positions. In addition, there is no good way for multiple users to interact on a single computer. For viewing video feeds from cable or satellite, large screen consumer television sets are most commonly used in the home entertainment center.

As can be seen, there is great duplication of function between the consumer electronics and personal computers, both of which are more and more likely to be found in a family room or great room of a home. This duplication of function leads to much more money being spent to fully outfit the home entertainment center and provide additional functions. When one component fails, since it has duplicate function, it is expensive to replace. One system that tried to solve some of the above problems is shown in U.S. Pat. No. 5,192,999 to Graczyk et al. That system has a television circuit and an audio circuit within a personal computer, both of which are controlled by a remote control device. The television circuit is used to receive common cable or broadcast video signals in NTSC format, which inherently have a lower quality than video signals currently broadcast by digital broadcasting satellite. NTSC format signals are interlaced, which means that every other line is refreshed during each scan of the picture tube. For example, odd lines would be refreshed during a first scan, and even lines during a second scan. Since there are 60 scans per second, odd lines are refreshed 30 times per second, and even lines are refreshed 30 times per second. VGA monitors refresh at least 60 times per second, providing a more coherent spatial and temporal image. The NTSC signal is a lower bandwidth signal than digital MPEG, which has a much higher bandwidth and allows productive use of even higher resolution monitors. While Graczyk et al. does convert the NTSC signals to VGA format for display by a data quality analog monitor, the signal quality is limited because of the lower bandwidth transmission. NTSC signals have a great effect on the type of text that can be displayed. With an interlaced display, the text displayed in normal fonts appears to jump as alternate lines are refreshed. There have been several attempts to design fonts that minimize this jump effect, but none have worked well. A VGA display, refreshing each line with every scan of the tube, does not have this problem, and provides a much sharper and readable image for text.

The monitor described by Graczyk is shown as a standard PC analog VGA monitor, and reference is commonly made to a single user. Such monitors are fairly small, having a maximum viewing area of 17.5 inches (44.5 cm) at the high end of the PC market. They are not nearly suitable for